A VISIT TO THE HAWAIIAN ISLANDS

BY T. D. A. COCKERELL

"For we have seen the golden sun
Sink in the sea,
The moonlight on the palms, and heard
God's melody."

It is not uncommon for modern writers, in discussing the islands of the Pacific, to begin by stating that they have little sympathy with the sentimental nonsense of previous authors, but propose to state the facts, and so forth. It is no doubt true that the expression of feeling concerning the islands has often been trifling or insincere, and at times wanting in judgment or good taste; but it should be recognized that language is barely adequate to do justice to the beauty, mystery, and romance of the subject. To the naturalist, at any rate, the splendid blue of the sea, the graceful curves of the cocoanut palms, the varied foliage of the mountain forests, are but the setting for a drama which at once stimulates and baffles his intellect. Whence came this marvellous fauna and flora? What influences have governed its evolution? Why this extraordinary multiplication of species, often with almost unbelievably restricted ranges? In spite of many learned tomes, we are still groping for light on these problems, but hopefully, convinced that their solution will furnish a key to some of the most perplexing questions confronting the biologist. With the facilities for research now established and being developed in Honolulu, we may expect to see the riddles of the Hawaiian biota attacked anew, with modern intensive methods, likely to give results of fundamental importance.

The naturalist of today is indeed fortunate, when he approaches the Hawaiian problem, in finding his path made comparatively easy by magnificent monographic works. The Fauna Hawaiiensis, the volumes of the Manual of Conchology, Jordan's lists of the fishes, give at first the impression that nearly all has been done, not only the fauna, but also the flora has

received elaborate treatment. Yet in spite of all this, it is still easy to make discoveries. Last summer, while I was in Honolulu, Dr. D. S. Jordan obtained a number of fishes new to the islands (some new to science) by visiting the market each morning. Perkins, in his classic Introduction to the Fauna Hawaiiensis, stated that in his opinion only about half the endemic or truly native species of insects had been discovered and described. Dr. C. Montague Cooke tells me that he could now about double the species of *Leptachatina* described in the monograph, and he has numerous undescribed snails of other genera. Thus the present investigator is in the doubly happy position of finding plenty of important work to do, while the foundations have been securely laid by masters of the science.

In still another respect the worker of today has advantages. He finds paved roads around the islands, and facilities for getting about are vastly superior to those of former times. Dr. Perkins writes me (October, 1924): "It is hard to realize now the conditions under which I worked, from 1892 to 1897 particularly. Roads were bad, often impassible in wet weather, and I did most of my work on foot. . . I cut many paths myself single-handed through the densest wet forests, sometimes 8 or 9 miles in length, and lumped tent, guns, and all apparatus and food on my back in such places."

In the following account of my own brief explorations, I am enabled to give the names of the snails through the kindness of Dr. C. Montague Cooke, who identified nearly all my specimens. I am responsible for the slugs. The hours I spent at the Bishop Museum, looking at the wonderful collection of Hawaiian shells and hearing Dr. Cooke discuss the problems involved, are never to be forgotten. May all his learning and enthusiasm find full expression in print, where it will reach those in other lands, and of later days! He speaks at times of organizing collections and data so that posterity may find it easy to proceed. This he has done and is doing daily, but who can expect that a successor of equal ability will be found? The history of science shows that unfinished work is too often neglected, or falls into incompetent hands, as indeed is true of human activities in general. Let any one familiar with modern

zoology name a dozen or twenty of the leading men now growing old, and ask himself who will step into their shoes. In too many cases one has sadly to say that no candidate is yet in sight, and none is likely to appear.

I had scarcely more than arrived in Honolulu when (July 16) Mr. O. H. Swezey, of the Sugar Planters Experiment Station, kindly offered to show me Mt. Tantalus and the upper part of the Manoa Valley. Mrs. Faus, formerly a student in our department at the University of Colorado, took us up the mountain in her car, and we circled round through the forest on an obscure trail known to Mr. Swezey, who pointed out the characteristic plants, insects and molluscs. Having been familiar with the literature of Hawaiian natural history since 1891, when I helped Dr. A. R. Wallace collect data for the second edition of "Island Life," it was with feelings readily to be imagined that I saw the *Achatinella* snails on the trees, caught the bees of the insular genus *Nesoprosopis*, observed the splendid butterfly *Vanessa tammeamea* circling through the glades, found the singular longicorn beetle *Plagithmysus pulverulentus* in its native home. The entomological results of the trip might form the subject of another article, but we are now concerned with the snails. The species collected on Mt. Tantalus were as follows:

Achatinella vulpina olivacea Reeve. This is the most widely spread form of *vulpina*, and ought to have been the type of the species. As is shown in Man. Conch., it occurs in ten or twelve valleys, the typical *vulpina* apparently only in three. My *olivacea* shells vary from green and pale yellowish to reddish-brown; usually bandless, but rarely with a peripheral black band.

A. stewartii producta Reeve. These are sinistral; remarkable for their large size. The type of *producta* is dextral, and one wonders whether the sinistral race on Tantalus (referred to in the Manual) is not an independent development. It is more robust than the dextral *producta* from the head of Manoa Valley, and looks like a different thing.

A. lorata Fér. A beautiful peg-top-shaped shell; some of the phase called *pallida* "Nuttall," Reeve; others pure white, the mut. *alba*, also named, but not described, by Nuttall (1839).

Amastra textilis Fér. One specimen.

Laminella gravida Fér. I got only dead shells.

Auriculella diaphana Smith. Sinistral.

Tornatellides proceralus Ancey. This minute species originally described from Maui, is widely distributed over the islands. Is it a very ancient, conservative form, or has it some unusual means of travel? On Kauai I found another *Tornatellides* (*macromphala* Ancey) which has a similar wide distribution.

Endodonta (or *Nesophila*) apparently a new species, which will be described by Dr. Cooke. It is a minute form, with rounded periphery and strong ribbing. I found several in a dead and dry tree-fern stem. It was astonishing to find an apparent novelty in such a well-worked locality, within sight of Honolulu.

Succinea rotundata and a small *Helicina* complete the set.

From near the top of Mt. Tantalus we crossed a marshy depression and came down a zigzag trail at the head of Manoa Valley. Although the distance was short, we found different snails, as follows:

Achatinella bellula Smith, of the pale, straw-yellow, slightly olivaceous, form, wholly without bands, except a very faint brownish one below the suture. This may be called mut. *straminea*, basing the name on the shell figured in Man. Conch., plate 41, f. 10d, but my shell is exactly the same.

A. stewartii Green. Beautiful green shells, usually with two black bands, but one of my shells is bandless. All are sinistral, whereas the original type was dextral.

A. stewartii producta Reeve. A long dextral shell, with narrower aperture than in my *stewartii* or the Mt. Tantalus "*producta*."

Amastra turritella Fér. Varying from warm reddish-brown to practically black.

Auriculella auricula Fér. Both sinistral and dextral shells of this neat little species, and the body whorl varying from white through fulvous to deep reddish-brown. One sinistral shell is entirely very pale yellowish.

Also *Philonesia* and *Opeas*.

At a later date I went with the Trail and Mountain Club to a waterfall at the head of Manoa Valley, in a deep gulch. Here I found the introduced *Opeas javanicum* Reeve, and what was much more interesting, a series of the slug *Philomycus australis* Bergh. This is a rather small pale grey slug, with three longitudinal bands, and irregular mottling both between and below the bands. I have investigated the synonymy, with special reference to the findings of Collinge (Journ. of Malacology, Dec., 1899), and reach the following conclusions:

(1) It is quite probable that the slug was introduced from China, and it may be, as Collinge claimed, identical with *P. bilineatus* (Benson). It has a jaw with numerous sharp ribs, which associates it with *bilineatus* and separates it from the Japanese *P. confusus* (Ckll.), which also differs in other respects. It must be remembered, however, that Benson's slug came from Chusan I., off the coast of China, and may be a local endemic species. A Chusan specimen in the British Museum is reddish-brown, and superficially appears rather unlike the Hawaiian animal. Thus it is premature to assume identity, and the Hawaiian species must continue to stand as *P. australis.*

(2) It is certain that *P. australis* is distinct from the Japanese *P. confusus* (Ckll.) and the Formosan *P. formosensis* (Ckll.). *P. chinensis* (Ckll.), found 1300 miles up the Yangtse, is more uncertain, but I now believe it is not *australis.*

It remains, of course, for some one to ascertain what forms of *Philomycus* occur in various localities in eastern Asia. One may surmise that when these are properly collected and studied, many species will be found.

Much lower in the Manoa Valley, within the limits of Honolulu, the introduced slug *Veronicella leydigi* (Simroth) is common.

After returning from the expedition to Kauai, described below, I was much occupied with the meetings of the Pan-Pacific Food Conservation Conference, and had little time to hunt for snails on Oahu. At Kawaihapai, on the north side of the island, I found it extremely dry, and on the mountain side overlooking the sea could find only *Succinea caduca* Mighels and the introduced *Eulota similaris.* I had been brought up in

England to look upon *Succinea* as almost semiaquatic, and it was surprising to find the genus in the dryest possible places. In Oahu, and particularly at Waimea on Kauai, I found hill-slopes with *Opuntia*, looking exactly like places in Madeira and Porto Santo which were most prolific in endemic Helicidae. But in the Hawaiian Islands one has to go to the moist forest for the native snails, xerophytic regions proving extremely barren, with rarely anything better than some common introduced form. There are some endemic insects which inhabit xerophytic stations, but probably such areas were extremely restricted prior to the changes brought about by man. At Sacred Falls, overlooking the northeast coast, I obtained *Amastra inflata* Pfr. and *Leptachatina fragilis* Gulick. The latter appears in the Manual as a synonym of *L. gummea* Gulick, but I infer that Dr. Cooke now considers it distinct.

In the fossil bed along the face of Diamond Head, where collecting is uncomfortable on account of the burs of the grass *Cenchrus*, I found *Leptachatina oryza* Pfeiffer, and *L. subcylindracea* Cooke, the latter evidently distinct, but first published as a variety of *L. oryza*.

When I went to the islands, one of my chief ambitions was to visit Kauai, the northernmost and in some ways most interesting island. On making enquiries, I was discouraged, being told that the journey would be both expensive and difficult. Very fortunately, I learned at this point that the Trail and Mountain Club was arranging their first expedition to the island, and had no difficulty in making arrangements to go along. As the Trail and Mountain Clubs have a system of interchangeable membership, the fact that I was a member of the Colorado Club at once gave me good standing in that of Honolulu. The trip, with a company of sixteen thoroughly congenial people, men and women, was made under the leadership of Mr. R. J. Baker, a well-known photographer of Honolulu. For fifty dollars each we had five glorious days on the island, with everything found, including a large truck to take us about, and also the steamer journeys back and forth. There was even enough left over for a celebration at the Outrigger Club at Waikiki, and a ride in an outrigger canoe. Certainly

the visitor who cares for out-of-door things cannot do better than get acquainted with the Trail and Mountain Club, which has a permanent office in the Young Hotel.

At a point on the eastern coast of Kauai, we left the road and took the trail leading inland, eventually reaching the Upper Anahola Valley. At different points along the trail I found snails, including *Leptachatina cylindrata* Pease, *L. striatula* Gould, *Microcystis chamissoi* Pfr., *Eulota similaris* Fér., *Opeas clavulinum* var. *hawaiicnse* Sykes, and *Helicina knudseni* Pilsbry and Cooke. *Microcystis chamissoi*, except for its larger size, is extremely similar to *M. venosa* Pease, which my wife collected last summer on the Island of Rarotonga.

There is a waterfall at the head of the Anahola Valley, which the party hurried on to see, but I stopped at a sharp turn in the trail, where the vegetation was dense and conditions looked promising for snails. I was richly rewarded by the discovery of several specimens of *Nesophila capillata* (Pease), which had not been found since Pease (Am. Journ. Conch., II, 1866, p. 292) recorded it as *Helix capillata* from the "Sandwich Islands." Dr. Cooke has one of Pease's original specimens, so there is no doubt about the identity. The species is omitted from the lists in Manual of Conchology.

On the north side of Kauai are the famous Haena caves, and in this vicinity I met with *Succinea humbulis* Gld., *Microcystis chamissoi* and *Eulota similaris*. The *Eulota* were of the bandless form (f. *unicolor* Fér.), while that from the Anahola Valley shows a brown band (f. *zonulata* Fér.). Such variation doubtless occurs throughout the range of the species.

Near the Haena caves, in the sand hills, I was able, following Dr. Cooke's directions, to find the deposit of fossil shells, containing great quantities of the variable *Carelia dolei* Ancey, which appears to be now extinct, all the known specimens being presumably from this deposit. The genus *Carelia*, with many species, is confined to Kauai and the neighboring island Niihau. Along with the *Carelia* I obtained the following:

Amastra nucleola Gld. Possibly also extinct, as the Manual says that although the species is common in collections, all the specimens have the appearance of having been collected dead.

Leptachatina brevicula Pease? The name queried by Dr. Cooke, and in fact it appears to be a different species, the aperture being conspicuously different from that of a cotype figured in the Manual.

L. brevicula micra Cooke. This is known in a living state from altitudes of 1500 to 1700 feet.

L. leucochila Gulick.

L. antiqua Pease? Name queried by Dr. Cooke. It is like the Koloa beach shells figured in the Manual, but very different from the more slender shell figured by Pease. Surely it should receive a new name.

Tornatellides macromphala Ancey. One juvenile.

Endodonta laminata Pease. A typical *Endodonta*, with keel.

Nesophila sp., apparently undescribed, but Dr. Cooke had 3 already, his MS. species "No. 8."

Helicina berniceia Pilsbry and Cooke. Only known fossil.

It would appear that these sandhill deposits are of Pleistocene age, reminding one very much of the deposits in the sandhills at Caniçal, Madeira, and with apparently about the same proportion of extinct species. I greatly regretted that I could not spend more time collecting in this locality.

THE TYPE OF ANCYLASTRUM IS ANCYLUS FLUVIATILIS, MULLER

BY A. S. KENNARD, A. L. S. AND B. B. WOODWARD, F. L. S.

But for the fact that more pressing work engaged us, Mr. Bryant Walker's reading of the facts governing the selection of the type of *Ancylastrum*[1] would have been challenged before.

The Rule (Art. 30, 11 e) is quite clear: "Species are excluded from consideration in determining the type of genera . . . which were not included under the generic name at the time of its original publication."

When *Ancylastrum* was created[2] the species *cumingianus* had

[1] Nautilus, XXXV, 1921, p. 5.

[2] Journ. de Conchyl., iv, 1853, p. 63. The name was employed, as the author admits, in agreement with Moquin-Tandon, who, however, claims it as his own (Hist. Moll. France, ii, p. 483).